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(58) Field of search
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(71) Applicants
Nippon Tansan Gas Co Limited (Japan),
32-36 Aoi 3-chome, Adachi-ku, Tokyo-to 120, Japan.
Asahi Malleable Iron Co Ltd (Japan),
Horinouchi 547-1, Kikugawa-cho, Ogasa-gun,
Shizuoka-ken 436, Japan

(72) Inventors
Yohoji Ozaki
Ichiro Fumino
Yuji Muramatsu
Noboru Kumakiri

(74) Agent and/or Address for Service
Withers & Rogers,
4 Dyer's Buildings, Holborn, London EC1N 2JT

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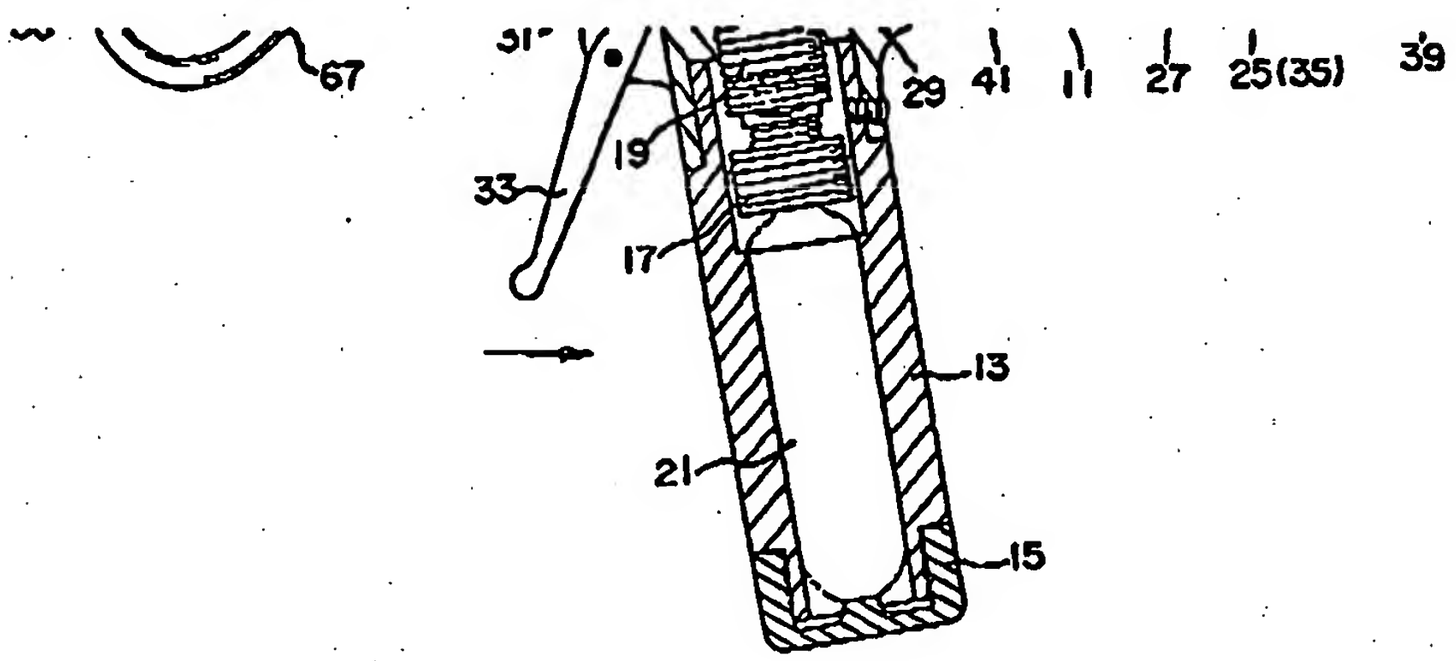
The following corrections were allowed under Section 117 on 13 May 1986

Front page Heading (71) Applicants
for Shizuoka-ken 436, Japan
read Shizuoka-ken, 439 Japan

THE PATENT OFFICE
27 May 1986



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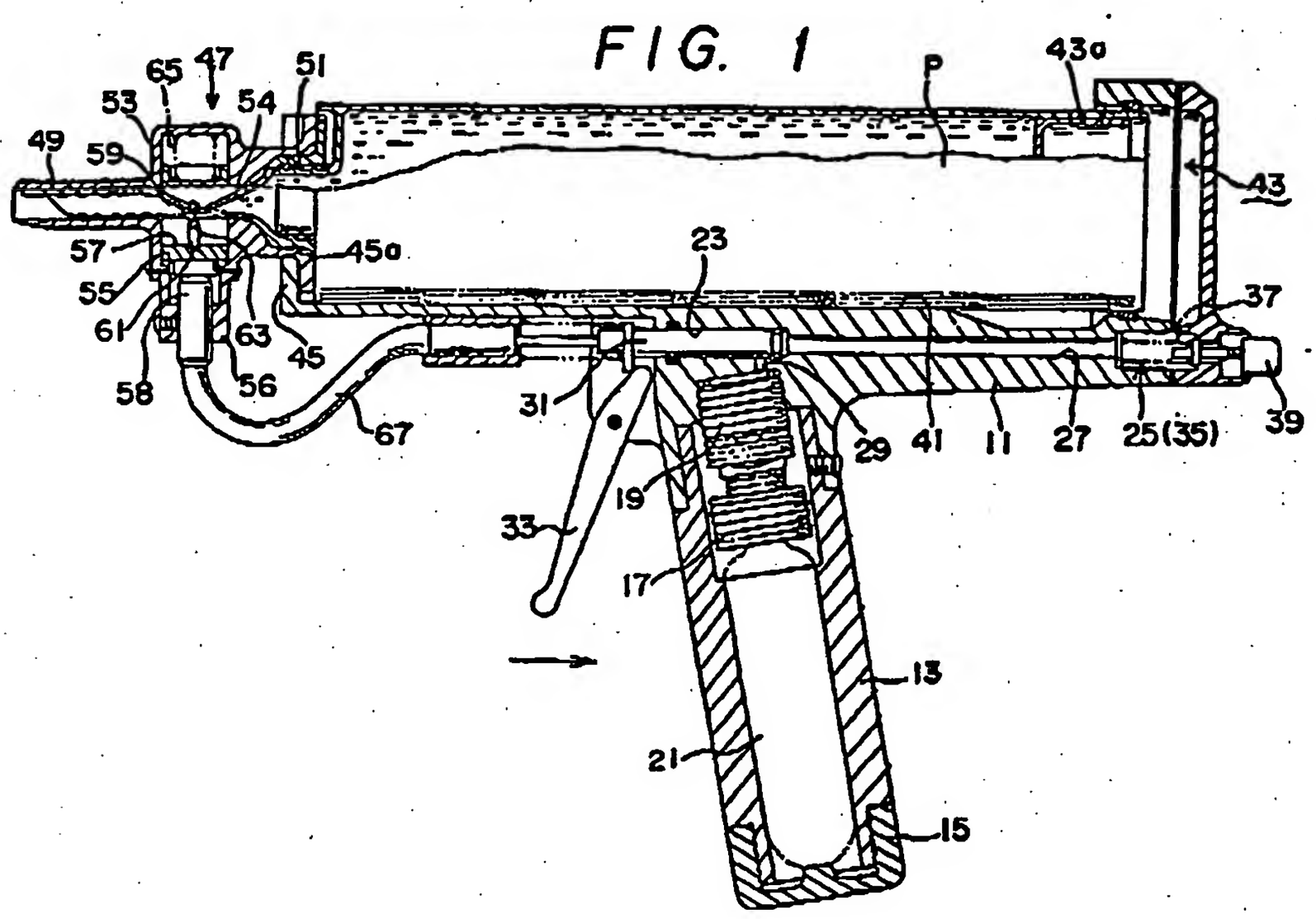
Noboru Kumakiri

(74) Agent and/or Address for Service
Withers & Rogers,
4 Dyer's Buildings, Holborn, London EC1N 2JT

(54) Viscous agent injecting instrument

(57) A viscous agent injecting instrument includes an injection control valve 55 provided at an injection port of a viscous agent filled cylinder P and a control lever 33 for actuating the valve 55, the lever and valve being connected by a flexible cable 67.

FIG. 1



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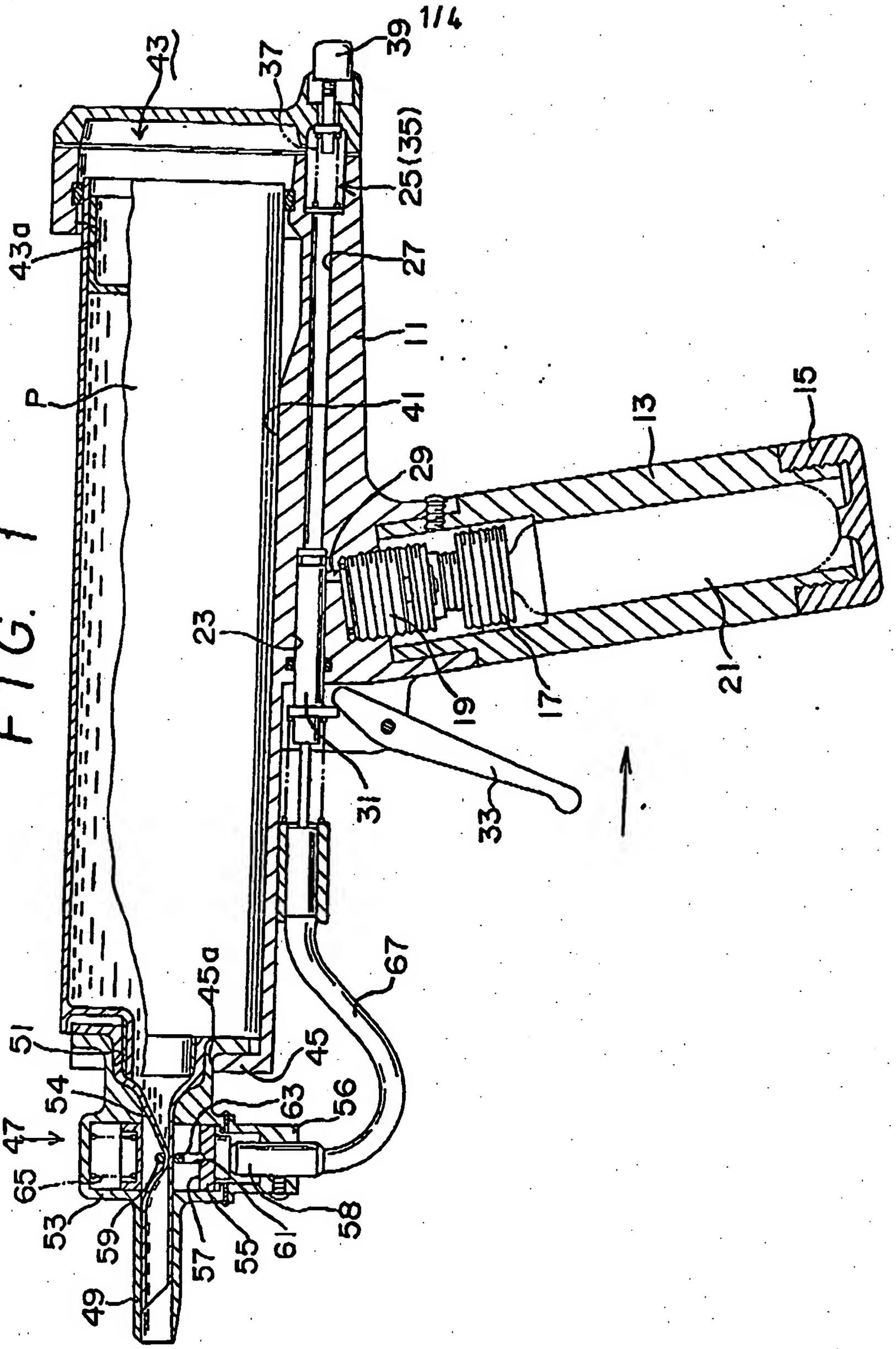
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FIG. 1

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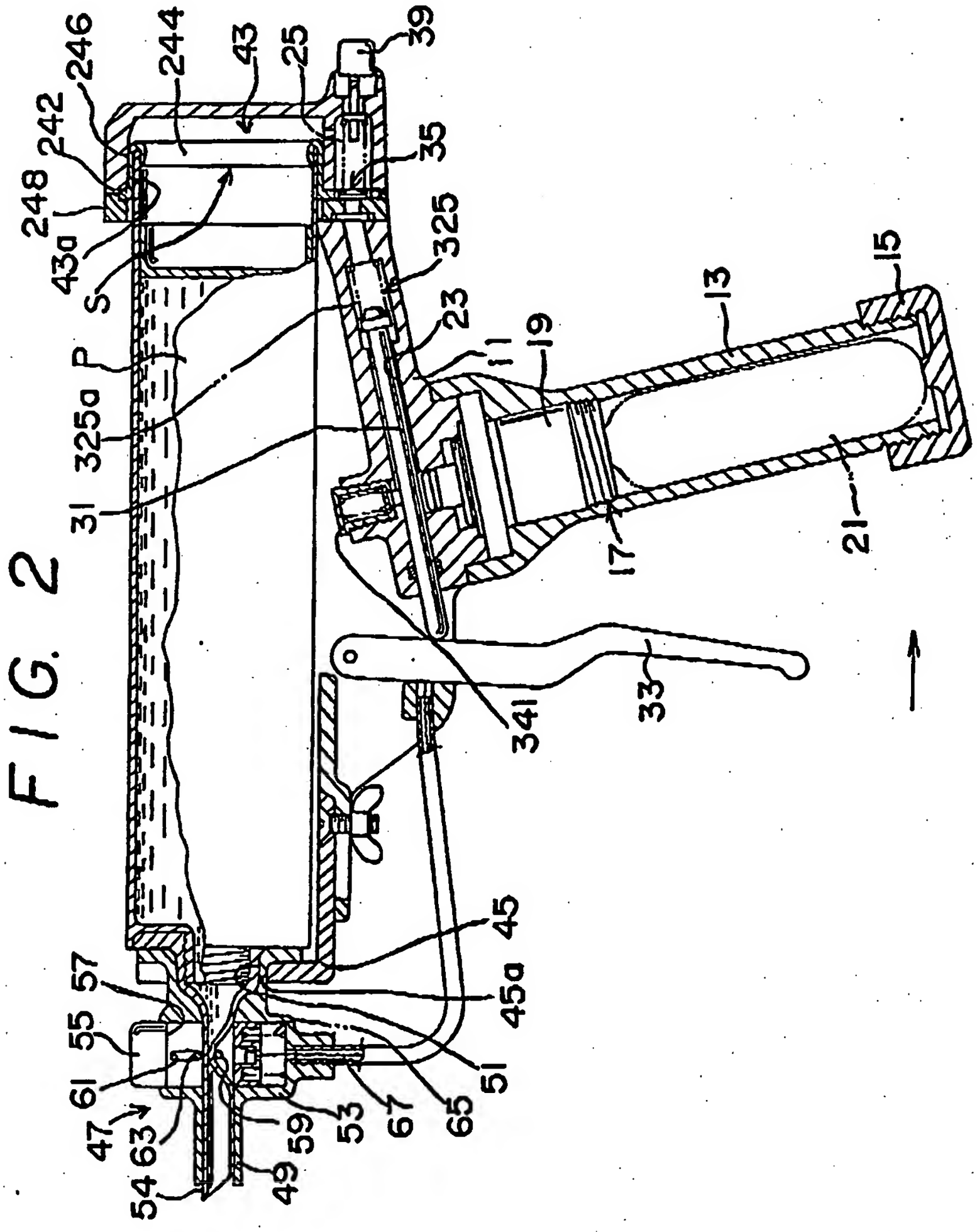

FIG. 2

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FIG. 3

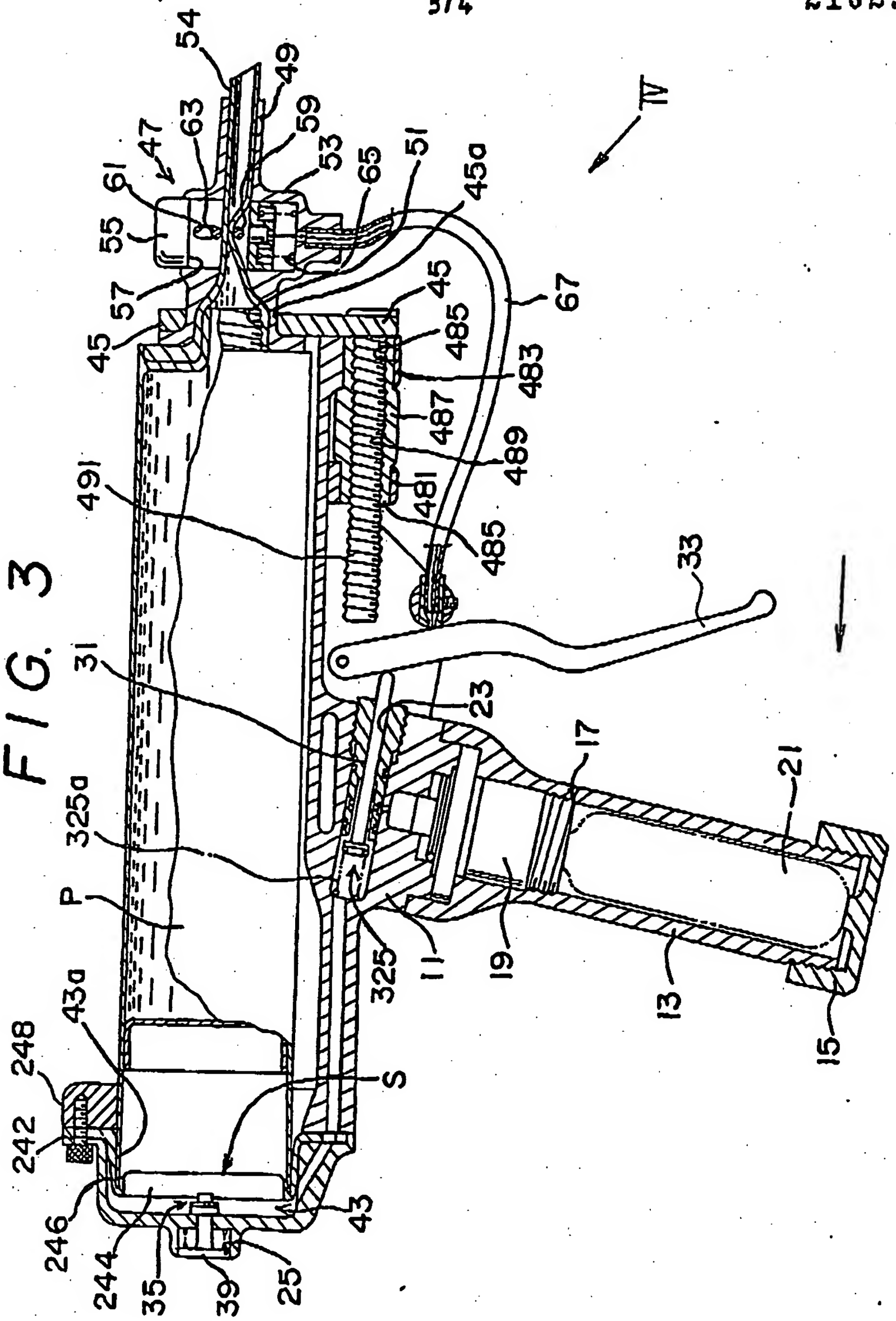
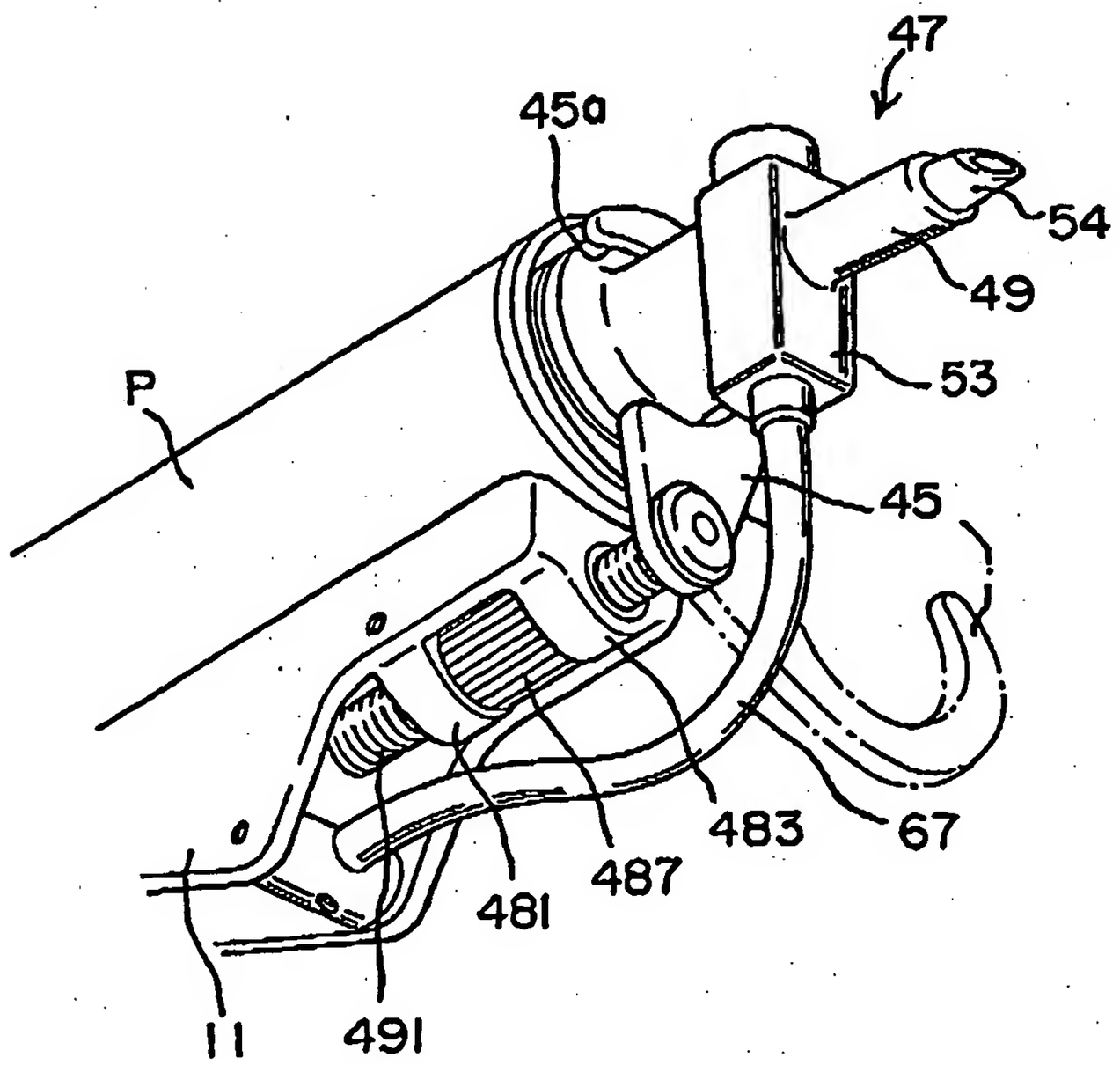


FIG. 4



SPECIFICATION

Viscous agent injecting instrument

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to an injecting instrument for feeding a viscous agent such as a sealing agent etc. by a pressurized gas.

2. Description of the prior Art

Heretofore, there are several instruments of the type mentioned above. However, since a control valve for controlling the injection and a basic portion of the instrument are generally of separate bodies, proper positional relation therebetween is indispensable in order to transmit action of a control lever to a valve body of the injection control valve. And, the proper adjustment of the positional relation requires considerable labor.

The present invention was accomplished in order to eliminate the above-mentioned problem inherent in the prior art instruments.

SUMMARY OF THE INVENTION

It is therefore a general object of the present invention to provide an injection control valve actuating apparatus, wherein action of a control lever is readily transmitted to a valve body of an injection control valve irrespective of positional relation between the injection control valve and a basic portion in a viscous agent injecting instrument.

In order to achieve the above object and others, there is essentially provided a viscous agent injecting instrument including an injection control valve actuating apparatus comprising an injection control valve provided at an injection port of a viscous agent filled cylinder, and a control lever mounted on a basic body and adapted to actuate the injection control valve, the control lever and a valve body of the injection control valve being associated with respect to each other by a transmission medium, whereby the transmission medium is a flexible cable.

Other objects and features of the present invention will become apparent from the following detailed description of the preferred embodiments of the present invention, when taken in conjunction with the accompanying drawings, in which:

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a sectional view of a viscous agent injecting instrument according to a first embodiment of the present invention;

Fig. 2 is likewise a sectional view of a second embodiment;

Fig. 3 is likewise aa sectional view of a third embodiment; and

Fig. 4 is a perspective view when viewed from the direction as shown by an arrow in Fig. 3.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Preferred embodiments of the present invention will be described hereunder with reference to the accompanying drawings.

Referring first to Fig. 1, a first preferred embodiment of the present invention will be described. In the figure, reference numeral 11 denotes a basic body, to which a grip cylinder 13 is secured by screw means. Reference numeral 15 denotes a screw cap for covering an opening formed in the grip cylinder 13.

Reference numeral 17 denotes an unsealing mechanism and reference numeral 19 denotes a pressure reducing valve. The unsealing mechanism 17 and the pressure reducing valve 19 are located within the grip cylinder 13. This unsealing mechanism 17 is adapted to unseal a carbon dioxide gas cylinder 21 contained within the grip cylinder 13. On the other hand, the pressure reducing valve 19 is adapted to gradually reduce a pressurized carbon dioxide gas flowed out from the carbon dioxide cylinder 21.

Reference numeral 23 denotes a cylindrical valve chest which is defined in an upper portion of the grip cylinder 13 in the basic portion 11. This valve chest 23 is communicated with a gas chamber 43 as will be described later through a flow passage 27 having a check valve 25, and also with a secondary side of the pressure reducing valve 19 through a communication hole 29. Reference numeral 31 denotes a valve rod fitted in the valve chest 23 for reciprocal movement. The valve rod 31 is reciprocally moved by action of a control lever 33. The reciprocal movement of the valve rod 31 causes the flow passage 27 to communicate with the communication hole 29 or discommunicate therefrom. The check valve 25 is integrally formed with a discharge valve 35. By pressing a knob 39 resisting the force of a compression spring 37, pressurized gas within the gas chamber 43 is degased.

Nextly, reference numeral 41 denotes a cylinder insertion recess which is formed in an upper part of the basic portion 11. This cylinder insertion recess 41 is adapted to insert therein a viscous agent filled cylinder P. Reference numeral 43 denotes a gas chamber which is formed at a rear part of the cylinder insertion recess 41. The gas chamber 43 has an opening 43a at the side of the cylinder insertion recess 41. An inner periphery of the opening 43a serves as a fitting seat for the viscous agent filled cylinder P. The viscous agent filled cylinder P is tightly fitted in the fitting seat which makes the gas chamber 43 as a sealed space. On the other hand, reference numeral 45 denotes a receiving seat having a cut-out, which is integrally formed with the basic body 11 at a front side of the cylinder insertion recess 41. The receiving

seat 45 is abutted with the tip portion of the viscous agent filled cylinder P inserted in the cylinder insertion recess 41.

Reference numeral 47 denotes an injection member which includes a nozzle 49 at its front end and a fitting opening 51 at its rear end. Fitted in the fitting opening 51 of the injection member 47 is the front end of the viscous agent filled cylinder P through an elastic tube 54 made of a rubber material. This injection member 47 is retained at the receiving seat 45, with the viscous agent filled cylinder P inserted in the recess 41. Reference numeral 53 denotes a valve casing which is formed between the nozzle 49 of the injection member 47 and the fitting opening 51. The valve casing 53 is formed in a cylindrical shape. The valve casing 53 includes at its inside a reciprocally movable rod-shaped valve body 55. Reference numeral 56 denotes a housing integrally formed with the valve casing by screw means. The housing 56 and the valve casing 53 may be rigidly formed. The housing 56 is adapted to accommodate therein driving means 58 for driving the valve body 55. The driving means 58 is reciprocally moved in accordance with reciprocal movement of a push-pull cable 67 as will be described hereinafter. Reference numeral 57 denotes a window which is formed on the valve body 55. The elastic tube 54 fitted in the viscous agent filled cylinder P is inserted in the window 57. Reference numeral 59 denotes a moving pin which is bridged over the window 57. As a result, the moving pin 59 is vertically moved in accordance with the reciprocal movement of the valve body 55. Reference numeral 61 denotes an elongated slot formed in the valve body 55. This elongated slot is adapted to permit a fixed pin 63 bridged over the valve casing 53 to insert therein. Inserted between the fixed pin 63 and the moving pin 59 is the elastic tube 54. Reference numeral 65 denotes a compression spring disposed within the valve casing 53 and adapted to biase the valve body 55 in the downward direction. Due to the foregoing, the elastic tube 54 between the fixed pin 63 and the moving pin 59 is discommunicated.

It is noted that the valve casing 53 and the valve body 55 correspond to the injection control valve of the present invention.

Nextly, reference numeral 67 denotes a push-pull cable adapted to the valve body 55 and the valve rod 31 each other. As a result, sliding movement of the valve rod 31 in the leftward direction by action of the control lever 33 causes the valve body 55 to push upwardly resisting force of the compression spring 65. When the action of the control lever 33 is released, the valve body 55 is pressed downward by the biasing force of the compression spring 65. Accordingly, the valve rod 31 is slided in the rightward direction.

Operation of the first embodiment will be described. If the control lever 33 is pulled in the direction of an arrow resisting the force of the compression spring 65, the valve rod 31 is slided in the leftward direction. As a result, the communication hole 29 and the flow passage 27 are communicated with each other which causes the pressurized carbon dioxide gas to flow into the gas chamber 43 to press the bottom surface of the viscous agent filled cylinder P. At the same time, the valve body 55 of the injection member 47 is pushed up through the push-pull cable 67. As a result, the elastic tube 54 resumes its communication. As a result, the viscous agent of the viscous agent filled cylinder P is injected from the nozzle 49.

If the pulling of the control lever 33 is released, the injection of the viscous agent is stopped. Then, the valve body 55 is pressed in the downward direction by the biasing force of the compression spring 65. Accordingly, the elastic tube 54 is discommunicated again by the moving pin 59 and the fixed pin 63. At the same time, the valve rod 31 is slided in the rightward direction through the push-pull cable 67. As a result, communication between the communication hole 29 and the flow passage 27 is broken. Accordingly, supply of the pressurized carbon dioxide gas into the gas chamber 43 is stopped.

Referring now to Fig. 2, a second preferred embodiment of the present invention will be described. Reference numeral 325 denotes an open-and-shut valve formed in a midway of a valve chest 23. This open and shut valve 325 is adapted to control the pressurized gas to be fed into a gas chamber 43 as will be described later. Reference numeral 31 denotes a valve rod forming a part of the open-and-shut valve 31. The valve rod 31 is reciprocally movably inserted in the valve chest 23 with its front end portion exposed. The valve rod 31 is reciprocally moved in accordance with oscillation of a control lever 33 and opens and shuts the open-and-shut valve 325. Reference numeral 65 denotes a compression spring disposed within a valve casing 53 and adapted to biase the valve body 55 in the upward direction. Due to the foregoing, an elastic tube 54 between a fixed pin 63 and a moving pin 59 is discommunicated in its normal state.

Nextly, reference numeral 67 denotes a flexible push-pull cable adapted to connect the valve body 55 and the operation lever 33 each other. Accordingly, when the valve rod 31 is slided in the rightward direction (direction of an arrow, see Fig. 2), the valve body 55 is pulled in the downward direction resisting the force of the compression spring 65 by action of the control lever 33. On the contrary, when the control lever 33 is released, the valve body 55 is pushed upward by the biasing force of the compression spring 65. As a result, communication of the elastic tube

54 is broken. At this time, the valve rod 31 is slided in the leftward direction by a compression spring (return spring) 325a of the open and shut valve 325. Reference numeral 341 denotes a safety valve which is disposed at an upper portion of the valve chest 23 in a basic portion 11. This safety valve 341 is adapted to prevent the gas pressure in the valve chest 23 from becoming unnecessarily high. A rear portion of the viscous agent filled cylinder P is fitted in an opening 43a through a seal member S. The seal member S is formed of an elastic material such as a rubber etc., and comprises a cylindrical member 246 having at its front end an outer flange 242 and at its rear peripheral portion an inwardly warped piece 244 integrally formed therewith, respectively. And, this seal member S is firmly fixed, with the outer flange 242 held by a frame member 248 at the internal periphery of the opening 43a in the state that its cylindrical member 246 is fitted between the opening 43a of the gas chamber 43 and the viscous agent filled cylinder P, and at the same time, the rear end periphery of the viscous agent filled cylinder P is held by and between the cylindrical body 246 and the inwardly warped piece 244.

Operation of the second preferred embodiment will be described. When the control lever 33 is pulled in the direction of an arrow resisting the compression springs 325a and 65, the valve rod 31 is slided in the rightward direction. As a result, the open-and-shut valve 325 is opened to permit the pressurized carbon dioxide gas to flow into the gas chamber 43. As a result, the bottom surface of the viscous agent filled cylinder P is pressed. At the same time, the push-pull cable 67 is pulled to pull down the valve body 55 of the injection control valve 47. As a result, the elastic tube 54 resumes its communication. As a result, the viscous agent of the viscous agent filled cylinder P is injected from the nozzle 49.

If the pulling of the control lever 33 is released, the injection of the viscous agent is stopped. Then, the valve body 55 is pushed in the upward direction by the biasing force of the compression spring 65. As a result, communication of the elastic tube 54 is broken again by the moving pin 59 and the fixed pin 63. At the same time, the valve rod 31 is slided in the leftward direction by the compression spring 325a to shut the open-and-shut valve 325. As a result, supply of the pressurized carbon dioxide into the gas chamber 43 is stopped.

Referring to Figs. 3 and 4, a third preferred embodiment of the present invention will be described. Reference numerals 481 and 483 denote supporting portions each having a through-hole 485. The supporting portions 481 and 483 are located at front lower end of the basic body 11. The pair of supporting portions 481 and 483 are spaced apart at a predetermined space with respect to each other. Reference numeral 487 denotes an adjusting screw rotatably inserted in the through-holes 485 of the supporting portions 481 and 483 through small diameter portions at both ends thereof. This adjusting screw 487 has an axial hole 489 formed with thread. Reference numeral 491 denotes a pivotal shaft screw corresponding to the pivotal shaft in claim 4, which is threadingly inserted into the axial hole 489 of the adjusting screw 487. Accordingly, the pivotal shaft screw 491 can be reciprocally moved by rotating the adjusting screw 487. Reference numeral 45 denotes a receiving seat having a cutout 45a (corresponding to the retaining portion in claim 4). The receiving seat 45 is fixed to a head portion of the pivotal shaft screw 491. By retaining the receiving seat 45 to an injection port of a viscous agent filled cylinder P through its cut-out 45a, the viscous agent filled cylinder P is fixed. In the case the pivotal shaft screw 491 is retreated by rotating the adjusting screw 487, if the construction thereof is such that the adjusting screw 487 is retreated by rotating the receiving seat 45 in the retaining direction (leftward rotation when viewed from the receiving seat 45 side), the receiving seat 45 is tended to rotate in the retaining direction of the discharge portion of the viscous agent filled cylinder P due to rotation of the adjusting screw 487. Therefore, the receiving seat 45 is more easily and firmly fixed. If the retaining direction of the receiving seat 45 is a rightward rotation when viewed from the front end side of the injection port of the viscous agent filled cylinder P, the adjusting screw 487 may be made to rotate in the rightward direction when viewed from the receiving seat 45 side.

Effects of the present invention will be described hereinafter. The viscous agent injecting instrument according to the present invention comprises an injection control valve provided at an injection port of a viscous agent filled cylinder, and a control lever mounted on a basic portion and adapted to actuate the injection control valve, the control lever and a valve body of the injection control valve being communicated with respect to each other by a communication medium, whereby the communication medium is a flexible cable.

Accordingly, action of the control lever can be transmitted to the injection control valve irrespective of a positional relation between the injection control valve and the basic body. Thus, mounting of the injection control valve does not require much time and labor.

Furthermore, even if a viscous agent injecting instrument is constituted such that a receiving seat is reciprocally moved according to the length of the cylinder of the viscous agent filled cylinder, association between the control

lever and the injection control valve is easy.

If the injection control valve includes a valve chest and a supporting housing for supporting a valve body driving means integrally formed together, in other words, if, in this viscous agent injecting instrument, the valve chest of the injection control valve and the housing of the valve body driving means are integrally formed together, the direction of the nozzle connected to the valve chest is not easily changed, even if a resiliency is produced between the valve body and the housing when the valve body is actuated.

Also, in an injection control valve having the above mentioned structure, a force is not applied around the injection port of the viscous agent filled cylinder. Accordingly, the thickness of the viscous agent filled cylinder can be made thin, which results in low manufacturing cost.

Furthermore, if the injection control valve is made to open when the flexible cable is pulled, association between the injection control valve provided at the injection port of the viscous agent filled cylinder and the open-and-shut valve for controlling supply of the pressurized gas is made smoothly. Thus, viscous agent injection work is made efficiently.

Furthermore, in a viscous agent injecting instrument wherein the basic portion is provided with a gas chamber having an opening and a receiving seat formed with a retaining portion, a rear end portion of the viscous agent filled cylinder being inserted in the opening of the gas chamber and the injection port of the viscous agent filled cylinder being retained in the retaining portion of the receiving seat, if the basic body is provided with an pivotal shaft screw on which the receiving seat is pivotally movably mounted, the receiving seat may be pivoted about the pivotal shaft at a time when the viscous agent filled cylinder P is attached or detached. Since the receiving seat does not interfere, attaching and detaching work of the viscous agent filled cylinder P is made easily.

Furthermore, in the viscous agent injecting instrument wherein the basic portion is provided with a gas chamber having an opening and a receiving seat formed with a retaining portion, a rear end portion of the viscous agent filled cylinder being inserted in the opening of the gas chamber and the injection port of the viscous agent filled cylinder being retained in the retaining portion of the receiving seat, if the receiving seat is reciprocally movably mounted by screw means, the receiving seat can be reciprocally moved by one action. Accordingly, the receiving seat can be adjusted easily.

Moreover, since the reciprocal movement of the receiving seat is adjusted by screw means, fine adjustment of the receiving seat is made easily.

Although the present invention has been described with reference to the preferred embodiments, many modifications and alternations may be made within the spirit of the present invention.

CLAIMS

1. A viscous agent injecting instrument including an injection control valve actuating apparatus comprising an injection control valve provided at an injection port of a viscous agent filled cylinder and a control lever for actuating the injection control valve mounted on a basic portion, said control lever and said injection control valve being associated with respect to each other by a transmission medium, whereby said transmission medium is a flexible cable.

2. A viscous agent injecting instrument according to claim 1, wherein said injection control valve includes a valve chest and a supporting housing for supporting a valve body driving means integrally formed together.

3. A viscous agent injecting instrument according to claim 1, wherein said injection control valve is opened at a time when said flexible cable is pulled.

4. A viscous agent injecting instrument according to claim 1, in which said basic body is provided with said gas chamber having an opening and a receiving seat formed with a retaining portion, a rear end portion of a viscous agent filled cylinder being inserted in the opening of said gas chamber and the injection port of said viscous agent filled cylinder being retained at the retaining portion of said receiving seat, whereby said basic body is provided with a pivotal shaft on which said receiving seat is pivotally movably mounted.

5. A viscous agent injecting instrument according to claim 1, in which said basic body is provided with said gas chamber having the opening and the receiving seat formed with the retaining portion, the rear end portion of the viscous agent filled cylinder being inserted in the opening of said gas chamber and the injection port of said viscous agent filled cylinder being retained at the retaining portion of said receiving seat, whereby said receiving seat is reciprocally moved by screw means.

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